



SEQUENCE LISTING

Griffith, Irwin J
Kuo, Mei-Chang
Luqman, Mohammad

<120> T CELL EPITOPES OF RYEGRASS POLLEN ALLERGEN

<130> IMI-040CP3

<140> 08/737,904

<141> 1996-11-20

<150> 08/106,016

<151> 1993-08-13

<160> 61

<170> PatentIn Ver. 2.0

<210> 1

<211> 1229

<212> DNA

<213> Escherichia coli

<220>

<221> CDS

<222> (40)..(942)

<400> 1

cgctatccct cctcgtaca aacaaacgca agagcagca atg gcc gtc cag aag 54
Met Ala Val Gln Lys
1 5

tac acg gtg gct cta ttc ctc gcc gtg gcc ctc gtg gcg ggc ccg gcc 102
Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Leu Val Ala Gly Pro Ala
10 15 20

gcc tcc tac gcc gct gac gcc ggc tac acc ccc gca gcc gcg gcc acc 150
Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Thr Pro Ala Ala Ala Ala Thr
25 30 35

ccg gct act cct gct gcc acc ccg gct gcg gct gga ggg aag gcg acg 198
Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Ala Gly Gly Lys Ala Thr
40 45 50

acc gac gag cag aag ctg ctg gag gac gtc aac gct ggc ttc aag gca 246
Thr Asp Glu Gln Lys Leu Leu Glu Asp Val Asn Ala Gly Phe Lys Ala
55 60 65

gcc gtg gcc gcc gct gcc aac gcc cct ccg gcg gac aag ttc aag atc 294
Ala Val Ala Ala Ala Ala Asn Ala Pro Pro Ala Asp Lys Phe Lys Ile
70 75 80 85

ttc gag gcc gcc ttc tcc gag tcc tcc aag ggc ctc ctc gcc acc tcc 342
Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly Leu Leu Ala Thr Ser
90 95 100

gcc gcc aag gca ccc ggc ctc atc ccc aag ctc gac acc gcc tac gac 390
Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys Leu Asp Thr Ala Tyr Asp
105 110 115

COPY

RECEIVED

SEP 28 2001

OFFICE OF PETITIONS

gtc gcc tac aag gcc gcc gag ggc gcc acc ccc gag gcc aag tac gac Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro Glu Ala Lys Tyr Asp 120 125 130	438
gcc ttc gtc act gcc ctc acc gaa gcg ctc cgc gtc atc gcc ggc gcc Ala Phe Val Thr Ala Leu Thr Glu Ala Leu Arg Val Ile Ala Gly Ala 135 140 145	486
ctc gag gtc cac gcc gtc aag ccc gcc acc gag gag gtc cct gct gct Leu Glu Val His Ala Val Lys Pro Ala Thr Glu Glu Val Pro Ala Ala 150 155 160 165	534
aag atc ccc acc ggt gag ctg cag atc gtt gac aag atc gat gct gcc Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp Lys Ile Asp Ala Ala 170 175 180	582
ttc aag atc gca gcc acc gcc gcc aac gcc gcc ccc acc aac gat aag Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys 185 190 195	630
ttc acc gtc ttc gag agt gcc ttc aac aag gcc ctc aat gag tgc acg Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala Leu Asn Glu Cys Thr 200 205 210	678
ggc ggc gcc tat gag acc tac aag ttc atc ccc tcc ctc gag gcc gcg Gly Gly Ala Tyr Glu Thr Tyr Lys Phe Ile Pro Ser Leu Glu Ala Ala 215 220 225	726
gtc aag cag gcc tac gcc gcc acc gtc gcc gcc gcg ccc gag gtc aag Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala Pro Glu Val Lys 230 235 240 245	774
tac gcc gtc ttt gag gcc gcg ctg acc aag gcc atc acc gcc atg acc Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met Thr 250 255 260	822
cag gca cag aag gcc ggc aaa ccc gct gcc gcc gct gcc aca ggc gcc Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala Ala Ala Ala Thr Gly Ala 265 270 275	870
gca acc gtt gcc acc ggc gcc gca acc gcc gcc gcc ggt gct gcc acc Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala Ala Gly Ala Ala Thr 280 285 290	918
gcc gct gct ggt ggc tac aaa gcc tgcacgctt gctaataac tactgaacgt Ala Ala Ala Gly Gly Tyr Lys Ala 295 300	972
atgtatgtgc atgatccggg cggcgagtgg ttttgttgat aattaatctt cgttttcggt	1032
tcattgcagcc gcgatcgaga gggcttgcatt gcttgtaata attcaatatt tttcattttct	1092
ttttgaatct gtaaatcccc atgacaagta gtgggatcaa gtcggcatgt atcaccgttg	1152
atgcgagttt aacgatgggg agtttatcaa agaattttatt attaaaaaaaa aaaaaaaaaa	1212
aaaaaaaaa aaaaaaa	1229

<210> 2
<211> 301

<212> PRT

<213> Escherichia coli

<400> 2

Met Ala Val Gln Lys Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Leu
1 5 10 15

Val Ala Gly Pro Ala Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Thr Pro
20 25 30

Ala Ala Ala Ala Thr Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Ala
35 40 45

Gly Gly Lys Ala Thr Thr Asp Glu Gln Lys Leu Leu Glu Asp Val Asn
50 55 60

Ala Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Asn Ala Pro Pro Ala
65 70 75 80

Asp Lys Phe Lys Ile Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly
85 90 95

Leu Leu Ala Thr Ser Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys Leu
100 105 110

Asp Thr Ala Tyr Asp Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro
115 120 125

Glu Ala Lys Tyr Asp Ala Phe Val Thr Ala Leu Thr Glu Ala Leu Arg
130 135 140

Val Ile Ala Gly Ala Leu Glu Val His Ala Val Lys Pro Ala Thr Glu
145 150 155 160

Glu Val Pro Ala Ala Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp
165 170 175

Lys Ile Asp Ala Ala Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala Ala
180 185 190

Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala
195 200 205

Leu Asn Glu Cys Thr Gly Gly Ala Tyr Glu Thr Tyr Lys Phe Ile Pro
210 215 220

Ser Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala
225 230 235 240

Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala
245 250 255

Ile Thr Ala Met Thr Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala Ala
260 265 270

Ala Ala Thr Gly Ala Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala
275 280 285

Ala Gly Ala Ala Thr Ala Ala Ala Gly Gly Tyr Lys Ala
290 295 300

<210> 3
<211> 20
<212> PRT
<213> Escherichia coli

<220>
<221> MOD_RES
<222> (7)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
<221> MOD_RES
<222> (13)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
<221> MOD_RES
<222> (16)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
<221> MOD_RES
<222> (20)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<400> 3
Ala Asp Ala Gly Tyr Thr Xaa Ala Ala Ala Thr Xaa Ala Thr Xaa
1 5 10 15

Ala Ala Thr Xaa
20

<210> 4
<211> 20
<212> PRT
<213> Escherichia coli

<220>
<221> MOD_RES
<222> (3)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
<221> MOD_RES
<222> (10)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<400> 4
Ala Thr Xaa Ala Thr Pro Ala Ala Thr Xaa Ala Ala Ala Gly Gly Lys
1 5 10 15

Ala Thr Thr Asp
20

<210> 5
<211> 20
<212> PRT
<213> Escherichia coli

<220>

<400> 5

Ala Ala Ala Gly Gly Lys Ala Thr Thr Asp Glu Gln Lys Leu Leu Glu
1 5 10 15

Asp Val Asn Ala
20

<210> 6

<211> 20

<212> PRT

<213> Escherichia coli

<400> 6

Glu Gln Lys Leu Leu Glu Asp Val Asn Ala Gly Phe Lys Ala Ala Val
1 5 10 15

Ala Ala Ala Ala
20

<210> 7

<211> 16

<212> PRT

<213> Escherichia coli

<400> 7

Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Asn Ala Pro Pro Ala Asp
1 5 10 15

<210> 8

<211> 20

<212> PRT

<213> Escherichia coli

<400> 8

Asn Ala Pro Pro Ala Asp Lys Phe Lys Ile Phe Glu Ala Ala Phe Ser
1 5 10 15

Glu Ser Ser Lys
20

<210> 9

<211> 20

<212> PRT

<213> Escherichia coli

<400> 9

Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly Leu Leu Ala Thr Ser
1 5 10 15

Ala Ala Lys Ala
20

<210> 10

<211> 20
<212> PRT
<213> Escherichia coli

<400> 10
Gly Leu Leu Ala Thr Ser Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys
1 5 10 15

Leu Asp Thr Ala
20

<210> 11
<211> 20
<212> PRT
<213> Escherichia coli

<400> 11
Pro Gly Leu Ile Pro Lys Leu Asp Thr Ala Tyr Asp Val Ala Tyr Lys
1 5 10 15

Ala Ala Glu Gly
20

<210> 12
<211> 20
<212> PRT
<213> Escherichia coli

<400> 12
Tyr Asp Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro Glu Ala Lys
1 5 10 15

Tyr Asp Ala Phe
20

<210> 13
<211> 20
<212> PRT
<213> Escherichia coli

<400> 13
Ala Thr Pro Glu Ala Lys Tyr Asp Ala Phe Val Thr Ala Leu Thr Glu
1 5 10 15

Ala Leu Arg Val
20

<210> 14
<211> 20
<212> PRT
<213> Escherichia coli

<400> 14
Val Thr Ala Leu Thr Glu Ala Leu Arg Val Ile Ala Gly Ala Leu Glu
1 5 10 15

Val His Ala Val

<210> 15
 <211> 20
 <212> PRT
 <213> Escherichia coli

<400> 15
 Ile Ala Gly Ala Leu Glu Val His Ala Val Lys Pro Ala Thr Glu Glu
 1 5 10 15
 Val Pro Ala Ala
 20

<210> 16
 <211> 20
 <212> PRT
 <213> Escherichia coli

<400> 16
 Lys Pro Ala Thr Glu Glu Val Pro Ala Ala Lys Ile Pro Thr Gly Glu
 1 5 10 15
 Leu Gln Ile Val
 20

<210> 17
 <211> 20
 <212> PRT
 <213> Escherichia coli

<400> 17
 Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp Lys Ile Asp Ala Ala
 1 5 10 15
 Phe Lys Ile Ala
 20

<210> 18
 <211> 20
 <212> PRT
 <213> Escherichia coli

<400> 18
 Asp Lys Ile Asp Ala Ala Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala
 1 5 10 15
 Ala Pro Thr Asn
 20

<210> 19
 <211> 20
 <212> PRT
 <213> Escherichia coli

<400> 19

Ala Thr Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe
1 5 10 15

Glu Ser Ala Phe
20

<210> 20
<211> 20
<212> PRT
<213> Escherichia coli

<400> 20
Asp Lys Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala Leu Asn Glu
1 5 10 15

Cys Thr Gly Gly
20

<210> 21
<211> 20
<212> PRT
<213> Escherichia coli

<400> 21
Asn Lys Ala Leu Asn Glu Cys Thr Gly Gly Ala Tyr Glu Thr Tyr Lys
1 5 10 15

Phe Ile Pro Ser
20

<210> 22
<211> 20
<212> PRT
<213> Escherichia coli

<400> 22
Ala Tyr Glu Thr Tyr Lys Phe Ile Pro Ser Leu Glu Ala Ala Val Lys
1 5 10 15

Gln Ala Tyr Ala
20

<210> 23
<211> 20
<212> PRT
<213> Escherichia coli

<400> 23
Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala
1 5 10 15

Pro Glu Val Lys
20

<210> 24
<211> 20

<212> PRT

<213> Escherichia coli

<400> 24

Ala Thr Val Ala Ala Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Ala
1 5 10 15

Ala Leu Thr Lys
20

<210> 25

<211> 20

<212> PRT

<213> Escherichia coli

<400> 25

Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met Thr
1 5 10 15

Gln Ala Gln Lys
20

<210> 26

<211> 20

<212> PRT

<213> Escherichia coli

<400> 26

Ala Ile Thr Ala Met Thr Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala
1 5 10 15

Ala Ala Ala Thr
20

<210> 27

<211> 20

<212> PRT

<213> Escherichia coli

<400> 27

Ala Gly Lys Pro Ala Ala Ala Ala Thr Gly Ala Ala Thr Val Ala
1 5 10 15

Thr Gly Ala Ala
20

<210> 28

<211> 20

<212> PRT

<213> Escherichia coli

<400> 28

Gly Ala Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala Ala Gly Ala
1 5 10 15

Ala Thr Ala Ala
20

<210> 29
<211> 16
<212> PRT
<213> Escherichia coli

<400> 29
Thr Ala Ala Ala Gly Ala Ala Thr Ala Ala Ala Gly Gly Tyr Lys Ala
1 5 10 15

<210> 30
<211> 20
<212> PRT
<213> Escherichia coli

<400> 30
Ile Ala Lys Val Pro Pro Gly Pro Asn Ile Thr Ala Glu Tyr Gly Asp
1 5 10 15

Lys Trp Leu Asp
20

<210> 31
<211> 20
<212> PRT
<213> Escherichia coli

<220>
<221> MOD_RES
<222> (5)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
<221> MOD_RES
<222> (8)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<400> 31
Ile Ala Lys Val Xaa Pro Gly Xaa Asn Ile Thr Ala Glu Tyr Gly Asp
1 5 10 15

Lys Trp Leu Asp
20

<210> 32
<211> 20
<212> PRT
<213> Escherichia coli

<400> 32
Thr Ala Glu Tyr Gly Asp Lys Trp Leu Asp Ala Lys Ser Thr Trp Tyr
1 5 10 15

Gly Lys Pro Thr
20

<210> 33
<211> 20
<212> PRT
<213> Escherichia coli

<400> 33
Gly Ala Gly Pro Lys Asp Asn Gly Gly Ala Cys Gly Tyr Lys Asn Val
1 5 10 15

Asp Lys Ala Pro
20

<210> 34
<211> 20
<212> PRT
<213> Escherichia coli

<400> 34
Gly Ala Gly Pro Lys Asp Asn Gly Gly Ala Cys Gly Tyr Lys Asp Val
1 5 10 15

Asp Lys Ala Pro
20

<210> 35
<211> 20
<212> PRT
<213> Escherichia coli

<400> 35
Cys Gly Tyr Lys Asp Val Asp Lys Ala Pro Phe Asn Gly Met Thr Gly
1 5 10 15

Cys Gly Asn Thr
20

<210> 36
<211> 22
<212> PRT
<213> Escherichia coli

<400> 36
Cys Gly Phe Asn Gly Met Thr Gly Cys Gly Asn Thr Pro Ile Phe Lys
1 5 10 15

Asp Gly Arg Gly Cys Gly
20

<210> 37
<211> 20
<212> PRT
<213> Escherichia coli

<400> 37
Pro Ile Phe Lys Asp Gly Arg Gly Cys Gly Ser Cys Phe Glu Ile Lys
1 5 10 15

Cys Thr Lys Pro
20

<210> 38
<211> 20
<212> PRT
<213> Escherichia coli

<400> 38
Ser Cys Phe Glu Ile Lys Cys Thr Lys Pro Glu Ser Cys Ser Gly Glu
1 5 10 15

Ala Val Thr Val
20

<210> 39
<211> 20
<212> PRT
<213> Escherichia coli

<400> 39
Glu Ser Cys Ser Gly Glu Ala Val Thr Val Thr Ile Thr Asp Asp Asn
1 5 10 15

Glu Glu Pro Ile
20

<210> 40
<211> 20
<212> PRT
<213> Escherichia coli

<400> 40
Thr Ile Thr Asp Asp Asn Glu Glu Pro Ile Ala Pro Tyr His Phe Asp
1 5 10 15

Leu Ser Gly His
20

<210> 41
<211> 20
<212> PRT
<213> Escherichia coli

<400> 41
Ala Pro Tyr His Phe Asp Leu Ser Gly His Ala Phe Gly Ser Met Ala
1 5 10 15

Asp Asp Gly Glu
20

<210> 42
<211> 20
<212> PRT
<213> Escherichia coli

<400> 42

Ala Phe Gly Ser Met Ala Asp Asp Gly Glu Glu Gln Lys Leu Arg Ser
1 5 10 15

Ala Gly Glu Leu
20

<210> 43

<211> 20

<212> PRT

<213> Escherichia coli

<400> 43

Glu Gln Lys Leu Arg Ser Ala Gly Glu Leu Glu Leu Gln Phe Arg Arg
1 5 10 15

Val Lys Cys Lys
20

<210> 44

<211> 20

<212> PRT

<213> Escherichia coli

<400> 44

Glu Leu Gln Phe Arg Arg Val Lys Cys Lys Tyr Pro Asp Asp Thr Lys
1 5 10 15

Pro Thr Phe His
20

<210> 45

<211> 20

<212> PRT

<213> Escherichia coli

<400> 45

Tyr Pro Asp Asp Thr Lys Pro Thr Phe His Val Glu Lys Ala Ser Asn
1 5 10 15

Pro Asn Tyr Leu
20

<210> 46

<211> 20

<212> PRT

<213> Escherichia coli

<400> 46

Val Glu Lys Ala Ser Asn Pro Asn Tyr Leu Ala Ile Leu Val Lys Tyr
1 5 10 15

Val Asp Gly Asp
20

<210> 47

<211> 20
<212> PRT
<213> Escherichia coli

<400> 47
Val Glu Lys Gly Ser Asn Pro Asn Tyr Leu Ala Ile Leu Val Lys Tyr
1 5 10 15

Val Asp Gly Asp
20

<210> 48
<211> 20
<212> PRT
<213> Escherichia coli

<400> 48
Ala Ile Leu Val Lys Tyr Val Asp Gly Asp Gly Asp Val Val Ala Val
1 5 10 15

Asp Ile Lys Glu
20

<210> 49
<211> 20
<212> PRT
<213> Escherichia coli

<400> 49
Gly Asp Val Val Ala Val Asp Ile Lys Glu Lys Gly Lys Asp Lys Trp
1 5 10 15

Ile Glu Leu Lys
20

<210> 50
<211> 20
<212> PRT
<213> Escherichia coli

<400> 50
Lys Gly Lys Asp Lys Trp Ile Glu Leu Lys Glu Ser Trp Gly Ala Val
1 5 10 15

Trp Arg Ile Asp
20

<210> 51
<211> 20
<212> PRT
<213> Escherichia coli

<400> 51
Thr Pro Asp Lys Leu Thr Gly Pro Phe Thr Val Arg Tyr Thr Thr Glu
1 5 10 15

Gly Gly Thr Lys

<210> 52
 <211> 20
 <212> PRT
 <213> Escherichia coli

<400> 52
 Val Arg Tyr Thr Thr Glu Gly Gly Thr Lys Ser Glu Val Glu Asp Val
 1 5 10 15

Ile Pro Glu Gly
 20

<210> 53
 <211> 20
 <212> PRT
 <213> Escherichia coli

<400> 53
 Ser Glu Val Glu Asp Val Ile Pro Glu Gly Trp Lys Ala Asp Thr Ser
 1 5 10 15

Tyr Ser Ala Lys
 20

<210> 54
 <211> 33
 <212> PRT
 <213> Escherichia coli

<220>
 <221> MOD_RES
 <222> (7)
 <223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
 <221> MOD_RES
 <222> (13)
 <223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
 <221> MOD_RES
 <222> (16)
 <223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
 <221> MOD_RES
 <222> (20)
 <223> GAMMA_CARBOXYGLUTAMIC ACID

<400> 54
 Ala Asp Ala Gly Tyr Thr Xaa Ala Ala Ala Ala Thr Xaa Ala Thr Xaa
 1 5 10 15

Ala Ala Thr Xaa Ala Ala Ala Gly Gly Lys Ala Thr Thr Asp Glu Gln
 20 25 30

```
<210> 55
<211> 20
<212> PRT
<213> Escherichia coli
```

```
<210> 56
<211> 20
<212> PRT
<213> Escherichia coli
```

```
<210> 57
<211> 1181
<212> DNA
<213> Escherichia coli
```

```
<220>
<221> mat_peptide
<222> (125)
```

gtg cag cag tac acg gtg gcg ctg ttc ctg gcc gtg gcc tcg tgt cgg 106
Val Gln Gln Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Ser Cys Arg
-20 -15 -10

gcc cgc gcc tcc tac gcc gcc gac gcc ggc tac gcc ccc gcc act ccc 154
Ala Arg Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Ala Pro Ala Thr Pro
-5 -1 1 5 10

gcc acc ccg gct acc ccc gcg gcc cca ggc gca gcg gtg cca gca ggg 202
Ala Thr Pro Ala Thr Pro Ala Ala Pro Gly Ala Ala Val Pro Ala Gly
15 20 25

aag gcg gcg acc gag gag cag aag ctg atc gag aag atc aac gcc ggc 250
Lys Ala Ala Thr Glu Glu Gln Lys Leu Ile Glu Lys Ile Asn Ala Gly

30										35										40										
ttc aag gcc gcc gtg gcg gcc gcc gcg ggc gtc ccg cca ggc gac aag	298																													
Phe Lys Ala Ala Val Ala Ala Ala Ala Gly Val Pro Pro Gly Asp Lys																														
45 50 55																														
tac aag acg ttc gtc gaa acc ttc ggc aag gcc tcc aac aag gcc ttc	346																													
Tyr Lys Thr Phe Val Glu Thr Phe Gly Lys Ala Ser Asn Lys Ala Phe																														
60 65 70																														
ctg ggg gac ctc ccg acc aac tac gcc gat gtc aac tcc agg gcc cag	394																													
Leu Gly Asp Leu Pro Thr Asn Tyr Ala Asp Val Asn Ser Arg Ala Gln																														
75 80 85 90																														
ctc acc tcg aag ctc gac gcc gcc tac aag ctc gcc tac gac gcc gcc	442																													
Leu Thr Ser Lys Leu Asp Ala Ala Tyr Lys Leu Ala Tyr Asp Ala Ala																														
95 100 105																														
cag ggc gcc acc ccc gag gcc aag tac gac gcc tac gtc gcc acc ctc	490																													
Gln Gly Ala Thr Pro Glu Ala Lys Tyr Asp Ala Tyr Val Ala Thr Leu																														
110 115 120																														
agc gag gcg ctc cgc atc atc gcc ggc acc ctc gag gtc cac gcc gtc	538																													
Ser Glu Ala Leu Arg Ile Ile Ala Gly Thr Leu Glu Val His Ala Val																														
125 130 135																														
aag ccc gct gcc gag gag gtc aag cct atc ccc gcc gga gag ctg cag	586																													
Lys Pro Ala Ala Glu Glu Val Lys Pro Ile Pro Ala Gly Glu Leu Gln																														
140 145 150																														
atc gtc gac aag att gac gtc gcc ttc aga act gcc gcc acc gcc gcc	634																													
Ile Val Asp Lys Ile Asp Val Ala Phe Arg Thr Ala Ala Thr Ala Ala																														
155 160 165 170																														
aac gcc gcc ccc acc aac gac aag ttc acc gta ttc gag acc acc ttt	682																													
Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Thr Thr Phe																														
175 180 185																														
aac aag gcc atc aag gag agc acg ggc ggc acc tac gag agc tac aag	730																													
Asn Lys Ala Ile Lys Glu Ser Thr Gly Gly Thr Tyr Glu Ser Tyr Lys																														
190 195 200																														
ttc att ccc acc ctt gag gcc gcc gtt aag cag gcc tac gcc gcc acc	778																													
Phe Ile Pro Thr Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr																														
205 210 215																														
gtc gca tcc gcg ccg gag gtc aag tac gcc gtc ttt gag acc gcg ctg	826																													
Val Ala Ser Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Thr Ala Leu																														
220 225 230																														
aaa aag gcg gtc acc gcc atg tcc gag gcc cag aag gaa gcc aag ccc	874																													
Lys Lys Ala Val Thr Ala Met Ser Glu Ala Gln Lys Glu Ala Lys Pro																														
235 240 245 250																														
gcc acc gcc acc ccg acc ccc acc gca act gcc gcg gcc gcg gtg gcc	922																													
Ala Thr Ala Thr Pro Thr Pro Thr Ala Thr Ala Ala Ala Val Ala																														
255 260 265																														
acc aac gcc gcc ccc gtc gct gct ggt ggc tac aaa atc tgatcaactc	971																													
Thr Asn Ala Ala Pro Val Ala Ala Gly Gly Tyr Lys Ile																														
270 275																														

gctagcaata tacacatcca tcatgcacat atagagctgt gtatgtatgt gcatgcatgc 1031
 cgtggcgccg cgcaagtttg ctcataatta attcttggtt ttcgttgctt gcatccacga 1091
 gcgaccgagc ccgtggatag tcgcatgtgt atgtaatttt ttctgagaaa tgtgtatatg 1151
 taatatataa ttgagtacta aaaaaaaaaa 1181

<210> 58
 <211> 303
 <212> PRT
 <213> Escherichia coli

<400> 58
 Met Ala Val Gln Gln Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Ser
 -20 -15 -10
 Cys Arg Ala Arg Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Ala Pro Ala
 -5 -1 1 5
 Thr Pro Ala Thr Pro Ala Thr Pro Ala Ala Pro Gly Ala Ala Val Pro
 10 15 20
 Ala Gly Lys Ala Ala Thr Glu Glu Gln Lys Leu Ile Glu Lys Ile Asn
 25 30 35 40
 Ala Gly Phe Lys Ala Ala Val Ala Ala Ala Gly Val Pro Pro Gly
 45 50 55
 Asp Lys Tyr Lys Thr Phe Val Glu Thr Phe Gly Lys Ala Ser Asn Lys
 60 65 70
 Ala Phe Leu Gly Asp Leu Pro Thr Asn Tyr Ala Asp Val Asn Ser Arg
 75 80 85
 Ala Gln Leu Thr Ser Lys Leu Asp Ala Ala Tyr Lys Leu Ala Tyr Asp
 90 95 100
 Ala Ala Gln Gly Ala Thr Pro Glu Ala Lys Tyr Asp Ala Tyr Val Ala
 105 110 115 120
 Thr Leu Ser Glu Ala Leu Arg Ile Ile Ala Gly Thr Leu Glu Val His
 125 130 135
 Ala Val Lys Pro Ala Ala Glu Glu Val Lys Pro Ile Pro Ala Gly Glu
 140 145 150
 Leu Gln Ile Val Asp Lys Ile Asp Val Ala Phe Arg Thr Ala Ala Thr
 155 160 165
 Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Thr
 170 175 180
 Thr Phe Asn Lys Ala Ile Lys Glu Ser Thr Gly Gly Thr Tyr Glu Ser
 185 190 195 200
 Tyr Lys Phe Ile Pro Thr Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala
 205 210 215

Ala Thr Val Ala Ser Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Thr
220 225 230

Ala Leu Lys Lys Ala Val Thr Ala Met Ser Glu Ala Gln Lys Glu Ala
235 240 245

Lys Pro Ala Thr Ala Thr Pro Thr Pro Thr Ala Thr Ala Ala Ala Ala
250 255 260

Val Ala Thr Asn Ala Ala Pro Val Ala Ala Gly Gly Tyr Lys Ile
265 270 275

<210> 59
<211> 20
<212> PRT
<213> Escherichia coli

<220>
<221> MOD_RES
<222> (7)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
<221> MOD_RES
<222> (13)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
<221> MOD_RES
<222> (16)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
<221> MOD_RES
<222> (20)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<400> 59
Ala Asp Ala Gly Tyr Thr Xaa Ala Ala Ala Ala Thr Xaa Ala Thr Xaa
1 5 10 15

Ala Ala Thr Xaa
20

<210> 60
<211> 20
<212> PRT
<213> Escherichia coli

<220>
<221> MOD_RES
<222> (3)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<220>
<221> MOD_RES
<222> (6)
<223> GAMMA_CARBOXYGLUTAMIC ACID

<220>

<221> MOD_RES

<222> (10)

<223> GAMMA_CARBOXYGLUTAMIC ACID

<400> 60

Ala Thr Xaa Ala Thr Xaa Ala Ala Thr Xaa Ala Ala Ala Gly Gly Lys
1 5 10 15

Ala Thr Thr Asp
20

<210> 61

<211> 20

<212> PRT

<213> Escherichia coli

<400> 61

Ala Asp Ala Gly Tyr Thr Pro Ala Ala Ala Ala Thr Pro Ala Thr Pro
1 5 10 15

Ala Ala Thr Pro
20